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ABSTRACT

According to the Coleman Report of 1966, the poor child considers his success a matter of fate or luck--something completely out of his control. If a child with this outlook is going to succeed, the child must receive immediate gratification for his educational achievements, and he must be shown that success is the result of a cause-and-effect mechanism which he can personally control. Computer assisted instruction is a nearly perfect instrument for this purpose because: (1) it gives the student total control; (2) it operates in a cause-and-effect mode; (3) it is direct; (4) it provides immediate feedback; and (5) it gives specific, explicit directions. Results of several experiments have shown that computer assisted instruction can dramatically improve results on standardized tests. (EMH)

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"CAI: Its Role in the Education of Ethnic Minorities"

by

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About ten years ago, the federal government undertook a massive program to wipe out poverty in America. The thrust of the program was towards those ethnic minorities that comprised the bulk of the poor. Particular emphasis was placed on the American of Mexican descent, the Black American and the American Indian. Further references to minority groups in this paper shall pertain only to these groups as that is where the data has been collected.

A central hypothesis of this program was that poverty is closely linked to failure in school on the part of minority children. Massive amounts of money have been poured into the educational institutions of the nation to achieve this goal. In spite of the best efforts of our nation's educators and the good intentions of the programs, these efforts have failed according to the goals and objectives set by the program directors.

So massive was the failure that it has caused educators to engage in considerable soul searching and ask themselves, "Just what can the school accomplish? What is beyond the reach of the schools?"

In its comprehensive study, the Center for Educational Policy Research at Harvard University reported, "There is no evidence that school reform can substantially reduce the extent of cognitive inequality, as measured by tests of verbal fluency, reading comprehension, or mathematical skill. Eliminating qualitative differences between elementary schools would reduce the range of scores in sixth grade by less than three percent. Eliminating qualitative differences between high schools would hardly reduce the range of twelfth-grade scores at all and would reduce by only one percent the disparities in the amount of education people eventually get."

One of its gloomy conclusions, "Our research suggests that the character of a school's output depends largely on a single input, the characteristics of the entering child. Everything else--the school budget, its policies, the characteristics of the teachers--is either secondary or completely irrelevant, at least so long as the range of variation among schools is as narrow as it seems to be in America." (Jencks 1972)

In the field of compensatory education, practitioners have been led by a succession of Messiahs who showed them the way. Each time the promised results did not materialize, yet the practices have lingered for want of something better.

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In constructing a social learning theory, J.B. Rotter (1966) stated: "When a reinforcement is perceived by the subject as following some action of his own, but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When the event is interpreted in this way by an individual, we have labeled this a belief in external control. If the person perceives that the event is contingent on his own relatively permanent characteristics, we term this a belief in internal control".

The Coleman Report (1966) found that this belief in destiny was a major determinant in school achievement. They concluded that this pupil attitude factor had a stronger relationship in achievement than all other school factors together.

Computer Assisted Instruction has shown convincing evidence that it is an effective medium for building internal control in the child who believes that his life is controlled by external forces.

The child in question typically has poor tolerance to delayed gratification. He usually sees minimal relationship between his actions of today with success or failure as represented by marks on a report card. The computer terminal, with its one or two second response time, graphically shows the pupil immediate feedback to his input. He knows he is in control and can readily see the cause and effect relationship to his actions.

Vasquez (1974) sees the understanding of cause-effect relationship as essential to internal attribution of success or failure on the part of the child. This understanding has not been developed adequately in the mind of the external individual because of negative social experiences within a culturally biased classroom. The problem then is how to build understanding of cause-and-effect in the externally controlled child.

Vasquez suggests four criteria by which to evaluate activities to accomplish understanding of the cause-effect relationship:

(1) See that the cause has sufficient power to produce the effect.

(2) Students should comprehend that without the cause, the action or result would not have occurred.

(3) Other equally likely causes must not be present if we are to identify a single cause.

(4) The cause must precede the event in time.

When judged by the above criteria, Computer Assisted Instruction gets high marks. Let us examine each of the above as compared with CAI.

As a result, educators have become increasingly skeptical of programs claiming success in raising achievement levels with children from a poverty background. To the uninitiated, proposing that achievement levels may be raised in children by having them sit in front of a computer terminal for fifteen minutes a day seems ludicrous. But, the facts are in. Standardized test scores have soared with children doing drill and practice on a daily basis using CAI. Those of us in elementary education who witnessed this phenomenon asked ourselves, "Why should CAI raise test scores when special reading teachers and teacher aides don't appear to be able to accomplish this? Why do reading scores go up when the child is taking arithmetic on CAI? Why do the slowest pupils make a significant jump in achievement when in other programs he continues to fall further behind?"

Locus of Control

The answers to these questions can be found when one examines children from homes with a heritage of poverty in the light of a concept called Locus of Control. This term refers to how the child perceives himself controlled. The internally controlled child perceives that he is in control of his own destiny, that his achievements are usually comensurate with his efforts, and that he can reach most goals that he sets for himself. The externally controlled child believes that his life is controlled by outside forces. He believes that what happens to him is the result of destiny, fate, luck, chance, the intervention of powerful others, or acts of God.

It is quickly evident that the child who perceives that there is no relationship between his own efforts and his achievements is under a tremendous handicap. Many of these children believe that there is no way they can help themselves succeed so they spend their time in trying to avoid failure. They do this by avoiding any situation where they might meet failure, thus, removing themselves either physically or psychologically from most learning situations.

The internal child, on the other hand, has learned to savor success. He spends his time putting himself in situations where he can succeed and once again know the pleasure that comes with success.

It appears that internallity can be fostered by activities that can (1) allow the child to establish a cause-and-effect relationship with his own actions, and (2) relate these activities without the intervention of a "powerful other" (teacher, aide, parent).

There is good evidence that reinforcement to learning activities is not effective if the child does not perceive a causal relationship between his own actions and the feedback that occurs. Studies have shown that low achieving children and often minority children perceive themselves as not having much control over their own fate. They perceive what happens to them as a result of who their friends are, what color their skin is, how much money their folks have, luck, etc.

(A) Sufficient Power. It is difficult to conceive of any medium that would have more power. Whenever the pupil indicates he has finished his input to the computer, there is almost instantaneous response that is solely related to the input.

(B) Cause-effect relationship. On CAI, the child instantly recognizes the relationship of the output to his input.

(C) Other causes. The interaction between the child and the terminal is direct, without the intervening intermediary of the teacher or others. The child must take full responsibility or credit for the response whatever it is.

(D) Temporal relationship. The immediate feedback provided by the computer is unexcelled. The computer usually responds within one or two seconds to the pupil's input.

There is much research to be done to determine the extent that CAI modifies the locus of control of the minority child. Empirical evidence suggests that there is substantial change. Hard data shows that there is highly significant growth in reading and math as measured by standardized tests. For example, Bone (1974) reported an average growth of 1.1 years growth over an eight month period in Chicago's inner city where the average growth had been close to .4 years growth in math for the period covered. Similar results have been reported from University of Akron, Stanford University, and from Montgomery County, Maryland.

Speculation as to why computer assisted instruction gives evidence of increased internality has included the following points:

(1) Immediate feedback.

(2) Lack of external variables to which a student might attribute his success or failure.

(3) The very specific directions that the computer gives the learner, and the computer's low tolerance for deviation from the directions.

(4) The one-to-oen relationship between the learner and the terminal.

(5) The programmed success that the pupil experiences on most CAI courseware.

In the Los Nietos School District, CAI is being implemented in five schools, grades four through eight. Teachers have remarked on the enthusiasm of the children towards the terminals and the change in attitudes that have accompanied the implementation of the program.

Teachers have reported that pupils who have been the most difficult to handle appear to be particularly attracted to the medium of CAI.

Evaluation of an innovation such as this is especially difficult to measure because of the number of uncontrolled variables involved. The following evidence has been observed and appears to have a relationship with CAI.

Scores on standardized test are sharply up.

Truancy and tardiness are down.

Children make intensive use of the computer terminals before and after school.

Vandalism of the school plants is down.

It appears that CAI is a valuable medium of instruction in school districts that are in the process of desegregation. One of the major obstacles has been the achievement of those children suffering the effects of racial isolation is often significantly lower than those children in the majority group. As CAI effectively brings up the achievement level of the lower quartile pupils, there is a reduction in the frustration level, the selfconfidence of the pupil improves, and the general emotional climate of the institution is improved.

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